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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Appln. of: J. G. Woods et al.
Title: Process for Hydroxyalkylating Carboxylic Acid-Functionalized
Materials
Application No: 09/341,287
Filed: August 19, 1999
Atty. Docket No.: 1221.002USU/LC-302/PCT/US
Examiner: Bernard Lipman, D. R. Wilson
Art Unit: 1713
Customer No.: 27673
Confirmation No.: 4956

Mail Stop Appeal Brief- Patents

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO EXAMINER'S ANSWER TO THE APPEAL BRIEF

We are enclosing for filing in the above-identified application the following:

1. Appellant's Response to Examiner's Answer to the Appeal Brief (*in triplicate*);
2. Transmittal letter (*in duplicate*); and
3. Postcard.

Please charge any additional fees or credit any such fees, if necessary to Deposit Account No. **01-0467** in the name of Ohlandt, Greeley, Ruggiero & Perle. A duplicate copy of this sheet is attached.

Respectfully submitted,

Date: May 14, 2004

By:

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V. Alexanian
Signature

May 14, 2004
Date



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RESPONSE TO EXAMINER'S ANSWER TO THE APPEAL BRIEF

Sir:

This is a Response to the Examiner's Answer, dated April 16, 2004, to the Appeal Brief that was filed by Appellants on March 22, 2004.

Appellants believe that no additional fees are due in connection with the filing of this Response. Nonetheless, in the event additional fees are due, the Commissioner is hereby authorized to charge any such fees in this connection, or credit any overpayment, to Deposit Account No. 01-0467 in the name of Ohlandt, Greeley, Ruggiero & Perle, LLP.

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The Amendment after Final filed in the Response to Advisory Action dated March 22, 2004 has been entered.

In response to the Examiner's Answer, Appellants submit the following:

Appellant's Response to the Section entitled "(9) Prior Art of Record:"

The Final Rejection of the claims was based on the following "Prior Art of Record:"

Okamoto	U.S. Patent No. 4,444,692
Merck Index	Section on "Ethylene Oxide"
Wu	U.S. Patent No. 4,266,046
Yoshino	"Synthetic Studies with Carbonates. Part 6. Syntheses of 2-Hydroxyethyl Derivatives by Reactions of Ethylene Carbonate with Carboxylic Acids or Heterocycles in the Presence of Tetraethylammonium Halides or under Autocatalytic Conditions", <u>J.C.S. Perkin I</u> , 1266-72 (1977)

However, the Examiner's Answer lists only Okamoto, Wu and Yoshino references under the "(9) prior art of record." It does not list "Merck Index" as being part of the prior art of record.

Appellants acknowledge this omission and view it to mean that the rejection of the claims based on all four references, i.e., Okamoto, Merck Index, Wu and Yoshino, has been **withdrawn** and that **only** the rejection of the claims based on Okamoto, Wu and Yoshino has been **maintained**.

Thus, Okamoto, Wu and Yoshino are the **only** references applied against the claims that are currently on appeal.

Appellant's Response to the Section entitled "(11) Response to Argument:"

On page 3, first paragraph of the "Response to Argument" section of the Examiner's Answer states:

"Appellants have argued that there is no motivation presented in the combination of references to, in fact, combine the references and reach the conclusion that the polymer of Okamoto be produced using ethylene carbonate in the presence of phase transfer catalysts instead of the ethylene oxide taught in the reference."

On page 4, lines 1-3, of the "Response to Argument" section of the Examiner's Answer refers to:

"...substitution of ethylene carbonate for ethylene oxide in the conversion of carboxylic acids to hydroxy functionality."

In the quoted segments above, the Examiner's Answer refers to: (1) "using ethylene carbonate in the presence of phase transfer catalysts instead of the ethylene oxide;" and (2) "substitution of ethylene carbonate for ethylene oxide;"

Okamoto describes a process for preparing a hydroxyl-terminated polymer using:

- (i) ethylene oxide; and
- (ii) a tertiary amine catalyst.

Wu describes a process for preparing polyesters of polycarboxylic acids using:

- (iii) a cyclic carbonate; and

- (iv) an alkylammonium halide catalyst.

Yoshino describes preparation of a mixture of mono- and di-esters of ethylene glycol with a mono-carboxylic acid using:

- (v) ethylene carbonate; and
- (vi) an alkylammonium halide catalyst.

While the starting materials and products in Wu and Yoshino are different from the starting materials and products of the claims currently on appeal and the starting materials and products in Wu and Yoshino are different from one another, the reagents employed by Wu or Yoshino are essentially the same.

If one uses "ethylene carbonate in the presence of phase transfer catalysts instead of the ethylene oxide" or if one substitutes "ethylene carbonate for ethylene oxide" as proposed by the Examiner's Answer, one would obtain a reaction mixture that has:

- (1) ethylene carbonate
- (2) a phase transfer catalyst; and
- (3) a tertiary amine catalyst.

Clearly, such a substitution would not produce the reaction mixture employed by the process defined by the claims currently on appeal, which employs ethylene carbonate and a phase transfer catalyst, but **no tertiary amine catalyst**. Thus, substituting ethylene carbonate and phase transfer catalyst for ethylene oxide does not produce the reaction mixture employed by the process defined by the claims currently on appeal. Furthermore, the presence of tertiary amine catalyst may destroy the intended purpose of the of the reaction, which is, in part, to produce the desired dihydroxyl-functionalized resin product without excessive molecular weight extension.

To arrive at the reaction mixture employed by the process defined by the claims currently on appeal, a person of ordinary skill in the art must not only replace ethylene oxide with ethylene carbonate and a phase transfer catalyst of Wu or Yoshino, but also must remove the tertiary amine from the reaction mixture of Okamoto.

There is no suggestion in the combination of Okamoto with Wu or Yoshino (even assuming the combination was proper, which it is isn't) to provide motivation for a person of ordinary skill in the art to replace ethylene oxide with ethylene carbonate and a phase transfer catalyst and further remove the tertiary amine catalyst.

Okamoto describes a process for preparing a hydroxyl-terminated polymer using: (i) ethylene oxide; and (ii) a tertiary amine catalyst.

Wu describes a process for preparing polyesters of polycarboxylic acids using a cyclic carbonate with a monomeric polyfunctional carboxylic acid in the presence of an alkylammonium halide catalyst. Yoshino describes preparation of a mixture of mono- and di-esters of ethylene glycol with a mono-carboxylic acid by the reaction of a monocarboxylic acid with ethylene carbonate in the presence of an alkylammonium halide catalyst.

The differences between the disclosures of these references and the invention defined by the instant claims is that Okamoto describes a process for preparing a hydroxyl-terminated polymer using ethylene oxide/tertiary amine catalyst combination but does not use cyclic carbonate/phase transfer catalyst combination whereas Wu uses a cyclic carbonate/alkylammonium halide catalyst with a monomeric polyfunctional carboxylic acid, such as, terephthalic acid, as the starting material, to prepare polyesters but does not use a dicarboxylic acid-functionalized polymer of polybutadiene, poly(butadiene-co-acrylonitrile), poly(acrylonitrile) or a combination

thereof to prepare a dihydroxyl-functionalized material. Yoshino uses ethylene carbonate/alkylammonium halide catalyst with a mono-carboxylic acid as the starting material to prepare a mixture of mono- and di-esters of ethylene glycol but, as in the case of Wu, does not use a dicarboxylic acid-functionalized polymer of polybutadiene, poly(butadiene-co-acrylonitrile), poly(acrylonitrile) or a combination thereof to prepare a dihydroxyl-functionalized material.

There is no teaching or suggestion in either Wu or Yoshino to use a dicarboxylic acid-functionalized polymer of polybutadiene, poly(butadiene-co-acrylonitrile), poly(acrylonitrile) or a combination thereof to prepare a dihydroxyl-functionalized material.

Conversely, there is no teaching or suggestion in Okamoto that ethylene oxide/tertiary amine catalyst combination can be replaced with ethylene carbonate/phase transfer catalyst such as, alkylammonium halide.

There is no suggestion in Okamoto to replace the basic tertiary amine catalyst with a neutral phase transfer catalyst. There is no suggestion in either Wu or Yoshino that phase transfer catalysts and tertiary amine catalyst are equivalent or interchangeable. There is no suggestion in any of the references that the basic tertiary amine catalyst can be replaced with a neutral phase transfer catalyst, or *vice versa*, and obtain the same result.

Because "chemical arts" are considered to be unpredictable arts, a person of ordinary skill in the art could not predict whether or not a reaction that is successful with basic tertiary amine catalyst can be replaced with a neutral phase transfer catalyst.

Further, neither Wu nor Yoshino teach or suggest that various starting materials used in either Wu or Yoshino could be replaced with a dicarboxylic acid-functionalized

polymer of polybutadiene, poly(butadiene-co-acrylonitrile), poly(acrylonitrile) or a combination thereof to prepare a dihydroxyl-functionalized material.

A person of ordinary skill in the art would not have "a reasonable expectation of success" in combining various elements, and then removing other elements, such as, a **tertiary amine**, which is a necessary ingredient for the reaction of Okamoto to be successful, unless such modification is **specifically** suggested. Without such a teaching or suggestion, a claimed invention cannot possibly be obvious.

On page 4, lines 16-20, of the "Response to Argument" section of the Examiner's Answer further states:

"In conclusion, contrary to Appellants' argument, the references themselves provide strong motivation to one of ordinary skill in the art to substitute ethylene carbonate and phase transfer catalysts in the reaction taught by Okamoto et al. using ethylene oxide."

The above conclusion in the Examiner's Answer is incorrect, because neither Wu nor Yoshino teach or suggest that, after replacing ethylene oxide in the reaction of Okamoto with ethylene carbonate and a phase transfer catalyst of Wu or Yoshino, one of ordinary skill in the art **must also remove the tertiary amine** from the reaction mixture of Okamoto, a requirement not taught or suggested by Wu or Yoshino.

Accordingly, because replacing the ethylene oxide/tertiary amine catalyst by a cyclic carbonate/phase transfer catalyst in the process of Okamoto followed by **removing the tertiary amine** is not taught or suggested by any of the cited art or any combination thereof, the cited combination of references cannot form the basis for a rejection of the claims currently on appeal except by **hindsight reconstruction**, which has long been recognized as being improper.

As mentioned briefly herein above, Okamoto describes a process for preparing a hydroxyl-terminated polymer using: (i) ethylene oxide; and (ii) a tertiary amine catalyst. Okamoto describes a process for preparing a hydroxyl-terminated polymer using ethylene oxide/tertiary amine catalyst combination but does not use cyclic carbonate/phase transfer catalyst combination.

Wu describes a process for preparing polyesters of polycarboxylic acids using a cyclic carbonate with a monomeric polyfunctional carboxylic acid in the presence of an alkylammonium halide catalyst. Wu uses a cyclic carbonate/alkylammonium halide catalyst with a monomeric polyfunctional carboxylic acid, such as, terephthalic acid, as the starting material, to prepare polyesters but does not use a dicarboxylic acid-functionalized polymer of polybutadiene, poly(butadiene-co-acrylonitrile), poly(acrylonitrile) or a combination thereof to prepare a dihydroxyl-functionalized material.

Yoshino describes preparation of a mixture of mono- and di-esters of ethylene glycol with a mono-carboxylic acid by the reaction of a monocarboxylic acid with ethylene carbonate in the presence of an alkylammonium halide catalyst. Yoshino uses ethylene carbonate/alkylammonium halide catalyst with a mono-carboxylic acid as the starting material to prepare a mixture of mono- and di-esters of ethylene glycol but, as in the case of Wu, does not use a dicarboxylic acid-functionalized polymer of polybutadiene, poly(butadiene-co-acrylonitrile), poly(acrylonitrile) or a combination thereof to prepare a dihydroxyl-functionalized material.

The starting materials of Okamoto, Wu and Yoshino belong to different classes of carboxylic acids. The carboxylic acids used as starting material by Wu is a monomeric polyfunctional carboxylic acid, not a polymeric polyfunctional carboxylic acid. The carboxylic acids used as starting material by Yoshino is a mono-carboxylic acid, not a polymeric polyfunctional carboxylic acid.

Further, the product obtained by Wu is polyester, not a dihydroxy-functionalized polymer. The product obtained by Yoshino is a mixture of mono- and di-esters of ethylene glycol, not a dihydroxy-functionalized polymer. Because "chemical arts" are considered to be unpredictable arts, a person of ordinary skill in the art could not predict whether or not a reaction that is successful with monomeric polyfunctional carboxylic acids or mono carboxylic acids, would also be successful with a polymeric dicarboxylic acid. Further, because "chemical arts" are considered to be unpredictable arts, a person of ordinary skill in the art could not predict whether or not a reaction that produces a polyester or a mixture of mono- and di-ester of ethylene glycol, would also be successful in producing dihydroxy-functionalized polymer. Therefore, in view of the unpredictability of the chemical arts, combining the above references would be improper and, as such, the combination of Okamoto, Wu and Yoshino would not render the instantly claimed invention obvious.

Furthermore, controlling the molecular weight of the hydroxyalkylated final product is advantageous for producing a useful hydroxyalkylated final product. The process according to the present invention provides a way to control the molecular weight of the hydroxyalkylated final product produced and, as a result, avoids extensive resin extension.

This is an unexpected result not taught or suggested by any of the cited references and is claimed nowhere but in the claims currently on appeal.

The absence of excessive resin extension in the dihydroxyl-functionalized material, is an important aspect of the present invention because low fusible-materials and block prepolymer resins prepared from HTBNs and organic diisocyanates are constrained by the permissible molecular weights of the reactants to achieve

appropriate physical properties in the final product. High molecular weight materials would not be useful in the compositions of the present invention.

Further, ability to control the molecular weight of the hydroxyalkylated final product is advantageous for producing a useful hydroxyalkylated final product. The process according to the present invention provides means for controlling the molecular weight of the hydroxyalkylated final product produced and, as a result, avoids extensive resin extension. This is an unexpected result not taught or suggested by any of the cited references or any combination thereof.

The absence of excessive resin extension in the dihydroxyl-functionalized material, is an important aspect of the present invention because low fusible-materials and block prepolymer resins prepared from HTBNs and organic diisocyanates are constrained by the permissible molecular weights of the reactants to achieve appropriate physical properties in the final product. High molecular weight materials would not be useful in the compositions of the present invention.

Because "chemical arts" are considered to be unpredictable arts, a person of ordinary skill in the art could not have predicted whether or not replacing ethylene oxide in the reaction of Okamoto with ethylene carbonate and a phase transfer catalyst of Wu or Yoshino, without also removing the tertiary amine would produce the desired product without excessive resin extension.

Appellants have amended claim 23 by defining that the "dihydroxyl-functionalized material has a molecular weight that is substantially unchanged relative to the molecular weight of said dicarboxylic acid-functionalized starting material." Thus, claim 23, as amended, incorporates this surprising and unexpected characterization so that **claim 23 is allowable at least for this reason alone.**

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Accordingly, the rejection of claims 23-28, 31, and 34-37 under 35 U.S.C. §103(a) as being obvious should be reversed and these claims should be allowed.

Based on the foregoing, reconsideration and withdrawal of the rejections of the pending claims and indication of their allowability is requested.

Respectfully submitted,

Date: May 14, 2004

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